

REMARKS

Claims 1-20 were presented for examination, are pending and are rejected.

Reconsideration is respectfully requested.

The 35 U.S.C. 103(a) Rejections

Claims 1-20 are rejected as being unpatentable over Meissner et al. in view of Tang. The rejection is respectfully traversed.

The Meissner patent (US 5,936,984) discloses a laser rod design with a polished barrel, which is also a feature common to the present invention. However, the Meissner patent only has a taper or flange on the undoped portion of the laser rod near the laser rod's two ends, while all of the independent claims (1, 12 and 16) of the present invention recite a taper over the entire doped length of the laser rod, central part as well as ends. It is important to understand that the taper over the entire length of the laser rod is motivated by the desire to control parasitic lasing in radiation patterns that are known in the laser scientific and technical literature as barrel modes. The independent claims have been amended to recite this limitation. An object of the present invention is to reduce the negative impact such parasitic barrel modes have on a rod laser's performance; a subject which is never mentioned in the Meissner patent. In the Meissner patent there is no mention or discussion of tapering a central doped portion of the laser rod, only the end caps of the rod are shaped.

The Tang patent (US 6,263,007 B1) contains a diagram showing a tapered gain volume (Fig. 9), but this is unrelated to the tapered laser rod of the present invention. An important difference between the tapered gain volume in the Tang patent and the

present tapered laser rods that the tapered region in the Tang patent is a low refractive index region (near unity, containing a gaseous medium), while the surrounding medium does not even have to be optically transparent at the laser wavelength. The independent claims of the present invention recite that the rod itself is in direct contact with and has a higher refractive index than the surrounding medium. The surrounding medium (typically cooling water or air) is required to be optically transparent at both the pump and the laser wavelengths. The reason for the tapers in the Tang patent are to pinch down the optical cavity so as to only permit lasing to occur in the fundamental (or TEM_{0,0}) mode – a technique known as spatial filtering in the laser scientific and technical literature. There is no connection between ASE and parasitic management and the use of tapered laser regions in the Tang patent. The Tang patent has no relevance to solid state lasers such as those to which the present invention applies. Further, Figure 9 of Tang describes a hollow volume for containment of a gas, and not a solid state laser rod. There is no connection between the claims of the present invention and the Tang invention per the discussion above.

Therefore the rejection of the independent claims (1, 12 and 16) and the claims that depend from each independent claim (2-11, 13-15 and 17-20, respectively) should be withdrawn.

Claims 1-20 are rejected as being unpatentable over Meissner et al. in view of Uchida. The rejection is respectfully traversed.

The Uchida patent requires that the laser medium in the gain element have a radially dependent refractive index so that it can act as a focusing element. This is clearly stated in claim 1 of the Uchida patent.

The present invention does not make any requirement or claim regarding the radial dependence of the refractive index within the laser rod. The patent is focused on the ability to aid in selecting a TEM₀₀ laser mode, a preferred form to generate laser radiation for many applications. There is no discussion of the reduction of barrel modes (a type of parasitic), as recited in all of the independent claims of the present invention.

It is not obvious from the Meisner patent that there is any value in tapering over the length of the laser rod. The tapering over the length of the rod, as recited in the independent claims of the present invention, is explicitly to reduce the negative impact of parasitic barrel modes within the lasing gain medium, an issue which is not even mentioned in the Meissner patent.

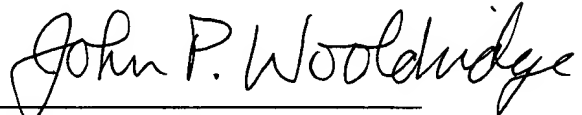
Therefore the rejection of the independent claims (1, 12 and 16) and the claims that depend from each independent claim (2-11, 13-15 and 17-20, respectively) should be withdrawn.

Conclusions

It is submitted that this application is in condition for allowance based on claims 1-20 in view of the amendments thereto and the foregoing comments.

If any impediments remain to prompt allowance of the case, please contact the undersigned at 808-875-0012.

Respectfully submitted,

A handwritten signature in cursive script that reads "John P. Wooldridge". The signature is written in black ink and is positioned above a horizontal line.

John P. Wooldridge
Attorney for Applicant
Registration No. 38,725

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